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## STUDIES OF THE SCHWEINITZ COLLECTIONS OF FUNGI—II

### DISTRIBUTION AND PREVIOUS STUDIES OF AUTHENTIC SPECIMENS

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Schweinitz is known to have given autograph specimens of fungi to no less than fourteen individuals and herbaria.<sup>1</sup> So far as the writers have been able to determine, the specimens sent to Halsey are no longer extant. The herbarium of Zeyher is said by de Candolle (7, p. 461) to be in the museum of the Grand Duke at Carlsruhe. This collection the writers have not examined and it is uncertain whether the Schweinitz specimens of fungi are there. Only a few of the specimens given to Schwaegrichen have been found, one having been seen in the herbarium at Strasburg, and a few in Kunze's collection in the herbarium of the University of Leipzig.

Other collections of fungi distributed by Schweinitz during his lifetime are preserved in the following herbaria: Kew, specimens sent to Torrey and Hooker; Upsala, herbarium of Fries; Academy of Natural Sciences, Philadelphia, Collins collection; Royal Botanic Garden, Edinburgh, herbarium of Greville; Paris Museum, herbarium of Brongniart; Vienna, herbarium of Jacquin; Berlin, herbaria of Link and Ehrenberg; Strasburg, herbarium of Nees von Esenbeck; Leipzig, herbarium of Kunze.

At his death in 1834, Schweinitz's herbarium was left to the Academy of Natural Sciences, Philadelphia. The Academy recognized the importance of this accession and a short time later published the biographical sketch of Schweinitz by Johnson which has been referred to in the preceding paper. The manner in which the specimens of fungi were arranged at the time they were transferred to the Academy, as well as the manner in which

<sup>1</sup> Studies of the Schweinitz Collections of Fungi—I. Sketch of his Mycological Work. MYCOLOGIA 4: 191. 1917.

the greater portion of them were subsequently rearranged and mounted has been already described and illustrated by the writers (41, pp. 6-11, pls. 3, 4, 5, 6).

When the former paper was prepared it was apparent that the greater part of the work of rearranging the specimens was done by Dr. Ezra Michener. No evidence could, however, be obtained as to the date at which this work was done. Nor was it clear whether the specimens were rearranged and mounted before or after the studies of Berkeley and Curtis. Realizing the importance of this information the writers have endeavored to obtain further data by correspondence with various people in this country and in England, and recently (December, 1916) have made a thorough search for possible manuscripts which might throw light on the question.

Fortunately, letters preserved in the files of the Academy of Natural Sciences at Philadelphia, which through the courtesy of Doctor Nolan the writers were permitted to examine, enabled them to settle these doubtful points. The early correspondence of the Academy is rather fragmentary, due to the fact that until about twenty years ago there were no salaried officers connected with the institution to whom the care of such matters could be entrusted. About eighteen years ago Doctor Nolan caused such letters as had by chance been preserved to be filed chronologically, and in these files letters from both Curtis and Michener were found. In addition, Miss Elsie M. Wakefield, of the Cryptogamic Herbarium, Royal Botanic Garden, Kew, has generously sent the writers such information as could be obtained from the letters of Curtis to Berkeley, preserved at the British Museum.

From these sources the writers have been able to learn the dates at which Curtis and Michener worked on the Schweinitz herbarium and also much about the work of each. This information is given chronologically below. According to Miss Wakefield:

"The correspondence of Berkeley and Curtis began about 1845 or 1846, and from the replies given in several of Curtis' letters it would appear that Berkeley made inquiries as to the whereabouts and preservation of Schweinitz's collection, the possibility of obtaining duplicates, etc., and urged Curtis to spend some time studying them.

"Curtis at first said it was impossible for him to find time to work in the Schweinitz herbarium.

"In 1851, however, he seems to have spent some time traveling for the sake of his health. In a letter dated October 23, 1851, he mentions some places he visited, and adds: 'My greatest performance was 17 hard—desperately hard—days at work on Herb. Schwein.' At this time there seems to have been no mycologist in charge of the herbarium, and Curtis says that the authorities, knowing the collection was of value, had begun *baking* the specimens in order to destroy insects. He was in time to stop this and to start poisoning operations. He then goes on: 'By the great favour of the Curators I was permitted after much hesitation and some bargaining to take a specimen from the collection when there were more than two of any species. I thus obtained so many, that with my notes and figures I can now authenticate two thirds of Schweinitz's list, I presume. Where I can divide my specimens I will share with you. Wherever I can make three good fragments I mean to give Fries the third. I can send you 10—1,200 I guess."

Evidently Curtis carried out this intention, as the senior writer has seen specimens in the Fries herbarium labeled "Ex Herb. Schwein" in Curtis's hand.

Curiously enough no mention of Curtis's visit could be found in the Proceedings, from which it seems probable that he dealt only with the "authorities," probably the curator of the collections. Curtis's interests in the herbarium and his concern for its preservation, as well as some indication as to the conditions under which he was allowed to take specimens can be obtained from his letter dated Society Hill, S. C., May 24, 1852, and now in the files of the Academy.

"I have been informed that the species of plants from different collectors & Authors in the Herb. of the Academy are much intermingled: so that where the same species is had from two or more persons, the specimens cannot be authenticated. If this be so, it is unfortunate & wrong, & will detract greatly from the value of the collection. If possible, such a course should be prevented in future. I hope, however, this is not the case to

any great extent. In the collection of Fungi,<sup>2</sup> which is the only portion I examined, there is occasional confusion of this sort, which, wherever it occurred, was exceedingly vexatious to me, as it effectually prevented the authentication of the species of the several authors. This would not be a very serious evil, if the specimens were always of one species. But where they differ, the evil is irreparable. I fear that a careless haste has had a good deal to do in causing their confusion. But where there is so much to be done, so few to do it, & labor gratuitous, I suppose we cannot expect everything to be done perfectly. Nevertheless, I hope you & others will see that no further confusion is made in your large & valuable Herbarium.

"I promised a critical review of the Fungi of Herb. Schweinitz for your Transactions, & also a collection of fungi. These will be prepared as soon as possible, but it will be some time first. Each will be more complete for delay. Please to wait upon me with all patience. I shall not forget the claims of the Academy upon me for the valuable privileges allowed me last Fall."

Shortly after the above letter was written "In a letter dated June 2, 1852," according to Miss Wakefield, "he advises the dispatch of nearly 1,500 of these duplicates of his Schweinitzian specimens. At the same time he mentions that he had promised the Philadelphia Academy a critical review, and asks Berkeley to send him his observations, so that the paper could be published in their joint names.

"Subsequent correspondence deals with the preparation of the two papers,—the one on Surinam fungi, and the 'commentary.'

"Early in 1855 Curtis also sent to Berkeley, for his examination, a parcel of mounted specimens from Herb. Schwein. ('over 300, I believe') which were to be returned when done with, as they were such as could not be divided. There is nothing to indicate whether these were all the remaining specimens in Curtis' possession, or only a part.

<sup>2</sup> The few instances in which such confusion occurs in Schweinitz's original packets, so far as the writers have observed, are those in which Schweinitz himself included specimens received from other collectors.

"Previous to this visit to Philadelphia, at the end of 1850 or very nearly in 1851, Curtis had also received about 200 Schweinitzian specimens from Torrey. These also he divided with Berkeley where possible. Evidently therefore Berkeley never saw the whole of Schweinitz's collection."

Curtis's interest in the herbarium and his concern about its state of preservation seems to have resulted in greater care on the part of the authorities. At any rate in the report of the curators for 1851, the year of his visit, mention is made of the necessity of more carefully guarding the collections.

In the report of the curators for 1855, (1) appears this brief entry: "The herbarium of phanerogamous plants is now undergoing careful rearrangement by Mr. E. Durand; and several of the members intend shortly to rearrange the collection of cryptogamia." Although Dr. Michener is not mentioned, it is certain that at this time he had been selected to rearrange the fungi, as indicated by the following note preserved in the files of the Academy:

"Will T. P. James please say to Dr. Zantzingen when convenient that would like him to see and send on the first order (Hymenomycetes) of Schweinitz Fungi with portfolios paper etc. whenever he can get them ready

"and oblige

"31 of 8 mo 1855"

"E. Michener."

The first package of fungi was apparently sent to Dr. Michener late in 1855, for early in the following year he wrote the botanical committee of the Academy of Natural Sciences<sup>3</sup> concerning the problems connected with their rearrangement. In this letter Michener speaks of the poor condition of many of the specimens and the fact that many of them had been destroyed by insects or had otherwise disappeared.

Subsequent letters from Michener to Dr. Zantzingen and to Dr. Meigs, of the Academy, indicate that Michener worked on the fungi at his home in New Garden, Pa., during this and the following winters. For in a letter dated 18th of 3d mo. 1857 he speaks of desiring "the balance of the herbarium." The material was evidently sent to him in several different lots by way

<sup>3</sup> Letter in the files of the Academy dated "New Garden 16 of 1 mo 1856."

of Wilmington, the paper on which the fungi were mounted being furnished by the Academy.

The manner in which Michener mounted the herbarium has been described and illustrated by the writers in another connection (41). It should be noted, however, that in transcribing the labels Michener sometimes did not include all the data given by Schweinitz. For example, the autograph label on the empty packet of *Sphaeria intermedia* L. v. S. says "Bethl in Crataego." The host is not given on the label in the mounted collection.

From the data which the writers have been able to gather it now seems certain that Berkeley never saw the whole of Schweinitz's collection. His work was based on material from three sources, the specimens sent by Schweinitz himself to Dr. Hooker, referred to above, specimens which Schweinitz gave Torrey who sent them to Curtis, and the specimens which Curtis obtained from the herbarium of the Academy of Natural Sciences in the fall of 1851. The greater portion of the specimens which Curtis had he divided with Berkeley and these are now deposited at Kew.

In the published work of Berkeley and Curtis (4), there is no indication as to the source of the particular specimen examined. But in Berkeley's personal copy of the "Synopsis Fungorum in America Boreali" (40), now in the library of the U. S. Department of Agriculture, many of the species are checked in pencil with a small mark  $\surd$ , "C," "H," or with two of these symbols. This the writers take to indicate the source of the specimen, whether from the Hooker collection, loaned by Curtis, or a part of Berkeley's own herbarium. For example, *Sphaeria radicalis* is marked "C" and "H" and there are specimens of this species in Hooker's herbarium and in the Curtis herbarium at Harvard; while *S. gyrosa* is marked "H" and a specimen has been found in Hooker's herbarium. In the early part of the book the species checked are chiefly those on which comment is made in the "Commentary on the Synopsis Fungorum in America Boreali media degentium, by L. D. de Schweinitz" but the marks occur throughout the book.

In the light of the fact that Curtis (see p. 336) sent Berkeley "about 300 specimens" to be returned later, it is of interest to

note that three hundred ten species are marked "C" in Berkeley's copy of the Synopsis Fungorum. Berkeley apparently studied microscopically the specimens which were to be returned to Curtis as in the margins over eighty habit sketches or drawings of spores with occasional notes have been made in pencil. These occur almost uniformly in connection with species marked "C."

So far as the writers have been able to learn, Curtis was the first to work with Schweinitz fungi after his death. His own herbarium then probably includes the first material taken from the Schweinitz collection. The specimens sent to Berkeley and to Fries are portions of the duplicates he took at that time. Michener's work was done a few years later and the specimens in his herbarium, which is now in the Mycological Collections of the U. S. Department of Agriculture, were evidently taken after Curtis's.

Both Curtis and Michener speak, in their letters, of numerous specimens being lacking. Schweinitz, as we stated in a letter to Torrey (Part I, p. 194), preserved very few of the Agarics, and it is evident that insects have caused great destruction among the fleshy forms that were kept. Moreover, in some cases he apparently gave away his last specimen of some species, as (41, p. 9) when he sent his only specimen of a species of *Hypoxylon* to Schwaegrichen.

Dr. John Shaw Billings was probably the next mycologist to study material from the Schweinitz herbarium. In the introduction to his paper on the genus *Hysterium* (6) he says: "My data for this purpose are derived from the examination of authentic specimens in the Schweinitz herbarium, and in the herbarium of Mr. H. W. Ravenel of South Carolina, from specimens named by Rev. M. A. Curtis, and from the description and figures given by M. Duby in his 'Memoire sur la Tribu des Hysterinees, Geneva, 1861.'"

Mr. Wm. C. Stevenson, Jr., of Philadelphia, became interested in the Schweinitz collection of fungi, according to his recent statement, about 1872, when he was made a member of the herbarium committee of the Academy of Sciences. Mr. Stevenson's interest in mycology early led to a correspondence and exchange of specimens with Mr. J. B. Ellis, of Newfield, N. J., and to a friendship

which lasted during Mr. Ellis's life. Mr. Stevenson did a considerable amount of work on the fungi of the Schweinitz herbarium, his paper on the Valsei of the United States (44) being based on Schweinitz specimens.

In the course of his work on the fungi he to some extent rearranged the specimens and relabeled the portfolios. Stevenson's labels give the numbers of the specimens included in each portfolio, whereas the original labels as prepared by Michener simply give the names of the genera included in the cover but not the numbers. This is evident from four empty covers bearing Michener's labels still preserved in the herbarium. In relabeling the volumes Stevenson evidently placed more sheets in a cover than Michener had done, which accounts for the four empty covers left over.

Certain specimens which were indicated as missing by Stevenson on the folio labels, *i. e.*, Nos. 1493 to 1663 and Nos. 1664 to 1809, were found some years ago in two packages labeled "This package as it came from the Smithsonian Institution." The sheets containing these specimens were placed in their proper places in the portfolios by Prof. J. C. Arthur and the senior writer during a visit to the herbarium in February, 1917, and a note to that effect placed on the labels of the portfolios. This the writers take to indicate that these specimens were loaned to the Smithsonian Institution before Stevenson relabeled the portfolios. Duplicates of many of these missing specimens are in the Curtis collection at Harvard. Dr. Farlow writes that there are 32 of the 42 species of *Puccinia* mentioned in North American Fungi (40) and 28 of these species are checked in Berkeley's personal copy. The Michener collection contains specimens of 37 of Schweinitz species of *Puccinia*.

In the last volume of the fungi as now arranged Nos. 2905 to 2972 (containing *Puccinia*, etc.) also 2973 to 2997 inclusive are missing. The original packets of Schweinitz are in the collection, as are the portfolios, bearing Michener's labels, which originally contained *Puccinia* and related genera. This indicates that Michener mounted these specimens as well as the others and that they disappeared subsequent to this work. In many cases where specimens are missing in the mounted collection there are pin holes

in the sheets showing apparently that the specimens were placed there by Michener but have since been removed.

During 1885 and 1886, Dr. J. W. Eckfeldt, of Philadelphia, critically examined and arranged the lichens in the herbarium of the Philadelphia Academy of Science. At this time the type collections of Schweinitz and Tuckerman were kept separate from the others and undisturbed. A general catalogue was, however, prepared in order to facilitate reference to these collections. Dr. Eckfeldt lists 462 species as occurring in the Schweinitz collection of lichens (I, p. 342).

It is evident that Tuckerman at some time made careful study of the lichens of the Schweinitz herbarium, for in Michener's list of lichens of Chester County (36, p. 451) Tuckerman, who prepared the descriptions of new species for this list, cites, as a new species, *Endocarpon arboreum*, Schweinitz, MS., and in his North American Lichens (45, p. 148) he says, "*Cladonia cetrarioides*, Schwein. herb. (Tuck. Suppl. 1, l. c. p. 427) is still only known to me in the original specimens (from North Carolina) of Schweinitz."

Ellis's studies of fungi in the Schweinitz collections, (22, 23) were all made, according to Mr. Stevenson, at the Academy. The later paper was apparently based on fungi from the "Collins Collection," which was found in 1894 in the herbarium of the Academy of Natural Science where it "had lain unnoticed for many years."

Durand (21) in preparing his monograph of the Geoglssaceae of North America studied Schweinitz's types in the herbarium at Philadelphia.

Lloyd (35) after "several visits" to Philadelphia for the purpose of studying Schweinitz's specimens published a revision of a number of species. Lloyd's conclusions as to the material on which the work of Berkeley and Curtis was based are evidently erroneous, as shown by the correspondence cited above.

In connection with their studies of the genus *Endothia* the writers have recently published (41) a discussion of the specimens collected by Schweinitz, based partly on specimens in the Philadelphia herbarium.

Berkeley and Curtis, Billings, Stevenson, Ellis, Tuckerman,

Durand, Lloyd, and the writers, have been mentioned as having published observations based on material in the Schweinitz herbarium at Philadelphia. Several of these investigators have also examined Schweinitzian specimens in other Herbaria. Berkeley had those contained in Hooker's herbarium at Kew and specimens sent by Torrey to Curtis. Durand mentions among the herbaria in which he studied (21, p. 393) Fries's herbarium at Upsala, The Kew Herbarium, and the Curtis Herbarium at Harvard. In connection with their studies on the genus *Endothia* the writers examined specimens in the Curtis and Michener herbaria and the senior writer examined specimens in all the European herbaria in which Schweinitz's specimens are known to exist (see page 333).

Berlese (5) cites original specimens of Schweinitz sent to him from Kew by Cooke. Cooke's (8-17) studies are based on Schweinitz material in the herbarium at Kew, as are also those of Currey. Currey (18-20), however, as the titles indicate, confined his published work largely to specimens in Hooker's herbarium. In the researches of Dr. Farlow (24-28), studies of Schweinitzian material are based chiefly on the Curtis collection, now in his own herbarium at Harvard. Fries (29, 30) and Kunze (33), of course, received specimens directly from Schweinitz, but the latter also had specimens given him by Schwaegrichen (p. 333). Von Höhnelt mentions (31, p. 393) having studied material from the herbaria at Berlin, Kew, Paris and Upsala, but makes few specific references (see 32, p. 356) to the source of particular specimens. Lister's (34) studies of Schweinitz's types are based on material at Kew. Nitschke (37) studied material from Kuntze's herbarium at Leipzig. Starbäck (42, 43), as the title of one of the papers indicates, based his work on material in Fries's herbarium, while the Tulasnes (46) had available the Brongniart herbarium, in Paris

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